

REMARKS

Claims 1, 3 to 7, 9 to 14, and 16 to 22 remain pending. Claims 2, 8, 15 and 23 have been canceled. Claim 24 has been added.

Claims 1, 4, 8, 10, 11, 12, 13, 15, 22, and 23 have been objected to for various informalities. Claims 4, 8, 10, 11, 12, 13, 15, 22, and 23 have been variously amended or canceled to traverse informalities. The objection to claim 1 for the term "homocyclopentadienyl" is traversed in that it will be apparent from the description in the specification at page 4, lines 17 to 21 that the terms relates to purely carbon-based moieties. The objection to claim 1 for the term "non-cyclopentadienyl" is traversed in that it will apparent from the description in the specification at page 5, lines 1 to 4 that it refers to ring moieties other than cyclopentadienyl. Examples of non-cyclopentadienyl ring moieties are given at lines 2 and 3, including ring moieties on Cp substituents, R', and X. Claims 2, 8, 15 and 23 have been canceled so the objections thereto are moot.

Claims 1 to 19 and 23 have been rejected under 35 U.S.C. 112, first paragraph, as non-enabling. The Action objected to the characterization of Cp being an optionally substituted and/or optionally fused heterocyclopentadienyl ligand.

The rejection of claims 1, 3 to 7, and 9 to 14 has been rejected under 35 U.S.C. 112, first paragraph, is overcome. Independent claim 1 as amended no longer refers to a heterocyclopentadienyl ligand.

The rejection of claims 2, 8, 15 and 23 rejected under 35 U.S.C. 112, first paragraph, is moot since they have been canceled.

Claims 1 to 19 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. The Action stated that is was not clear what structural feature was being claimed by the term "heterocyclopentadienyl ligand".

The rejection of claims 1, 3 to 7, and 9 to 14 has been rejected under 35 U.S.C. 112, second paragraph, is overcome. Independent claim 1 as amended no longer refers to a heterocyclopentadienyl ligand.

The rejection of claims 2, 8, and 15 rejected under 35 U.S.C. 112, second paragraph, is moot since they have been canceled.

Claim 22 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. The Action stated that there were eight structural isomers of bis(dimethylindenyl)Hf dibenzyl and that is was unclear as to which isomer was being claimed.

The rejection of claim 22 under 35 U.S.C. 112, second paragraph, is overcome. Claim 22 as amended extends to all eight isomers, which is within the scope of the claimed invention. Specification of a particular isomer is not required by the claim as drafted.

Claims 1, 3 to 5, 8, 9, 18, 19, and 23 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,767,208 to Turner et al. (Turner). The Action stated that for product-by-process claims, the burden is on the applicant to

establish an obviousness difference when the product is in the prior art even if the process is different than in the prior art. The Action also stated that patentability of a product rests in the product formed rather than the method of production.

Turner relates to bridged multi-ring hafnium metallocenes, bridged, heteroatom-containing monocyclopentadienyl titanium complexes, and unbridged bulky group 15-containing monocyclopentadienyl titanium complexes.

The rejection of claims 1, 3 to 5, 9, 18, and 19 under 35 U.S.C. 102(b) over Turner is overcome. Independent claim 1 has been amended to require that $M = \text{Hf}$, $n = 0$, and R be absent. Since Turner discloses bridged metallocenes, claim 1 as amended distinguishes over it and is novel in view of it. Turner does not disclose use of non-bridged hafnium type complexes. In fact, Turner teaches away from the use of non-bridged hafnium type complexes. In column 10, Turner indicates that bridged catalysts give higher M_w , better comonomer incorporation, and better activity. In column 10, Turner indicates that bridged catalysts give higher M_w , better comonomer incorporation, and better activity. That may be true of catalysts where the sigma ligands have a beta hydrogen atom, but not for the non-bridged complexes of the claimed invention, which are free of these atoms.

The rejection of claims 8 and 23 under 35 U.S.C. 102(b) in view of Turner is moot since they have been cancelled.

Claims 1 to 23 have been rejected under 35 U.S.C. 102(b) as being anticipated by WO 00/40620 to Skar et al. (Skar). The Action stated that for product-by-process claims, the burden is on the applicant to establish an obviousness difference when the product is in the prior art even if the process is different than

in the prior art. The Action also stated that patentability of a product rests in the product formed rather than the method of production.

The rejection of claims 1, 3 to 7, 9 to 14, and 16 to 22 under 35 U.S.C. 102(b) in view of Skar is overcome. Independent claim 1 as amended requires that $Y = -SiR'_3$. Thus, the claimed process is novel in view of Skar.

Further, claim 1 as amended is nonobvious in view of Skar. The claimed invention relates to the formation of hafnium metallocene catalysts that exhibit high activity and possess long life spans, especially for use in multistage polymerisation processes. The inventors have surprisingly found that by replacing the commonly used sigma chlorine ligands with ligands in which no beta hydrogen atoms are present, e.g. a benzyl ligand or a methyltrimethylsilyl ligand, activation of the hafnium species is considerably improved, giving higher catalyst activities and resulting in improved processing behaviour and end product homogeneity. The catalysts of the claimed invention show longer life spans than conventional dichloro metallocenes, and, therefore, are of particular interest in multi-stage processes. This effect is shown in Example 12, which employs bis n-butylcyclopentadienyl hafnium dibenzyl, whereas comparative example 8 employs bis n-butyl cyclopentadienyl hafnium dichloride, the catalyst exemplified by Skar. Under the same conditions and using the same carrier, the productivity of the dibenzyl species is much greater than that of the dichloride species (Table 3).

Improvements are also shown in table 4. Examples 14 and 15 show higher activities and larger life spans than comparative example 10 (the third entry in table 4 is example 15 not example

16). Example 16 shows better results than example 11 (example 16 is not comparative).

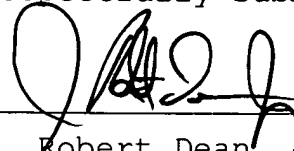
Improved productivity is especially useful in a two-stage polymerisation process as then in both stages a sufficient production rate can be obtained. The life spans of certain metallocene dichlorides such as the hafnium complex bis n-butyl cyclopentadienyl hafnium dichloride are short causing a drastic decrease in productivity especially in a two-stage process. In a process where the catalyst is being transferred from a first reactor to a second reactor, it is critical that the life span of the catalyst be long enough for the active species to persist in the second reactor, e.g., in the later stage of a loop/gas phase continuous polymerisation process. This is not achieved using metallocene dichloride compounds of the prior art. Conversely, the results shown in Table 4 show that productivity can be maximised for a long period.

The rejection of claims 2, 8, 15 and 23 under 35 U.S.C. 102(b) in view of Skar is moot since they have been canceled.

New claim 24 more particularly defines Cp, and, thus, more particularly distinguishes over the disclosure of Skar.

Reconsideration of claims 1, 3 to 7, 9 to 14, and 16 to 22 is deemed warranted in view of the foregoing, and allowance of said claims and new claim 24 is earnestly solicited.

Respectfully submitted,



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